

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Previously Presented): A method of generating a source of metallic vapor for a material processing operation, comprising:

heating an inert carrier gas;

vaporizing a metallic element or metallic element salt in the presence of the heated inert carrier gas;

transporting the vaporized metallic element or salt in the heated inert carrier gas to a temperature-controlled processing chamber; and

selectively ionizing the vaporized metallic element or salt to generate a plasma.

Claim 2 (Currently Amended): A method of generating a source of metallic vapor for a material processing operation, comprising:

heating an inert carrier gas;

vaporizing a metallic element or metallic element salt in the presence of the heated inert carrier gas, wherein the metallic element or salt is selected from the group consisting of Ca, Sr, Ba, Mn, Cd, Zn, CaCl₂, CaBr₂, NbCl₅ and ZrCl₄;

transporting the vaporized metallic element or salt in the heated inert carrier gas to a temperature-controlled processing chamber; and

depositing the vaporized metallic element or salt on a substrate in atomic layer thicknesses within the chamber.

Claim 3 (Previously Presented): The method of claim 2, wherein the carrier gas is heated to a temperature at which the vapor pressure of the metallic element or salt of at least 0.01 mTorr.

Claim 4 (Previously Presented): The method of claim 2, wherein the carrier gas is heated to a temperature at which the vapor pressure of the metallic element or salt of at least 5 mTorr.

Claim 5 (Original): The method of claim 3, wherein the carrier gas is heated to a temperature between about 100 and 1000°C.

Claim 6 (Original): The method of claim 3, wherein the processing chamber is heated to about the same temperature as the carrier gas.

Claim 7 (Previously Presented): The method of claim 2, wherein the chamber is heated at least in part by resistive heating elements in or on the chamber walls.

Claim 8 (Previously Presented): The method of claim 2, wherein the inert carrier gas comprises at least one of Ne and Ar.

Claim 9 (Original): The method of claim 7, wherein the metallic element or salt is selected from the group consisting of alkaline earth metals and transition metals with vapor pressures greater than 0.01 mTorr at temperatures below 1000°C, and salts thereof.

Claim 10 (Original): The method of claim 2, wherein the substrate is cooled to a temperature below the temperature of the carrier gas.

Claim 11 (Original): The method of claim 2, wherein the substrate is cooled to a temperature below the vaporization temperature of the vaporized metal or salt.

Claim 12 (Original): The method of claim 10, wherein the substrate is cooled by being in contact with a cooled platform.

Claim 13 (Cancelled).

Claim 14 (Previously Presented): The method of claim 2, wherein the substrate is a material selected from the group consisting of silicon, SiO₂, ZnO and HfO₂.

Claim 15 (Original): The method of claim 14, wherein the metallic element or salt is Ca and the substrate is SiO₂.

Claim 16 (Original): The method of claim 15, wherein the carrier gas and processing chamber are heated to a temperature of about 780°C.

Claim 17 (Original): The method of claim 16, wherein the substrate is at a temperature of no more than about 400°C.

Claim 18 (Original): The method of claim 2, wherein the deposition is controlled by adjusting the vapor pressure of the element and a combination of the carrier gas pressure and flow rate.

Claims 19-22 (Cancelled).

Claim 23 (Previously Presented): A method of Claim 1 wherein the vaporizing of the metallic element or metallic element salt is accomplished using the heated inert carrier gas.

Claim 24 (Previously Presented): A method of Claim 1 wherein the metallic element or salt is selected from the group consisting of Ca, Sr, Ba, Mn, Cd, Zn, CaCl₂, CaBr₂, NbCl₅ and ZrCl₄.

Claim 25 (Previously Presented): A method of Claim 1 wherein selectively ionizing the vaporized metallic element or salt to generate a plasma comprises selectively photo-ionizing the metallic element or salt without ionizing the inert carrier gas.

Claim 26 (Currently Amended): A method of Claim 25 ~~wherein~~ further comprising generating an ion beam from the selectively ionized metallic element or salt.

Claim 27 (Currently Amended): A method of Claim 26 ~~wherein~~ further comprising implanting a substrate using the ion beam.

Claim 28 (Currently Amended): A method of Claim 27 ~~wherein~~ further comprising depositing a layer of the selectively ionized metallic element or salt onto a substrate.

Claim 29 (New): A method of generating a source of metallic vapor for a material processing operation, comprising:

heating an inert carrier gas;

vaporizing a metallic element or metallic element salt in the presence of the heated inert carrier gas, wherein the metallic element or salt is selected from the group consisting of Ca, Sr, Ba, Mn, Cd, CaCl₂, CaBr₂, NbCl₅ and ZrCl₄;

transporting the vaporized metallic element or salt in the heated inert carrier gas to a temperature-controlled processing chamber; and

depositing the vaporized metallic element or salt on a substrate in the chamber.

Claim 30 (New): The method of claim 29, wherein the substrate is a material selected from the group consisting of silicon, SiO₂, ZnO and HfO₂.

Claim 31 (New): The method of claim 30, wherein the metallic element or salt is Ca and the substrate is SiO₂.

Claim 32 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a metallic element or salt selected from the group consisting of Ca, CaCl₂, and CaBr₂.

Claim 33 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a material consisting of Sr.

Claim 34 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a material consisting of Ba.

Claim 35 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a material consisting of Mn.

Claim 36 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a material consisting of Cd.

Claim 37 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a material consisting of NbCl₅.

Claim 38 (New): The method of claim 29, wherein vaporizing the metallic element or metallic element salt in the presence of the heated inert carrier gas, includes vaporizing a material consisting of ZrCl₄.